FIG. 1

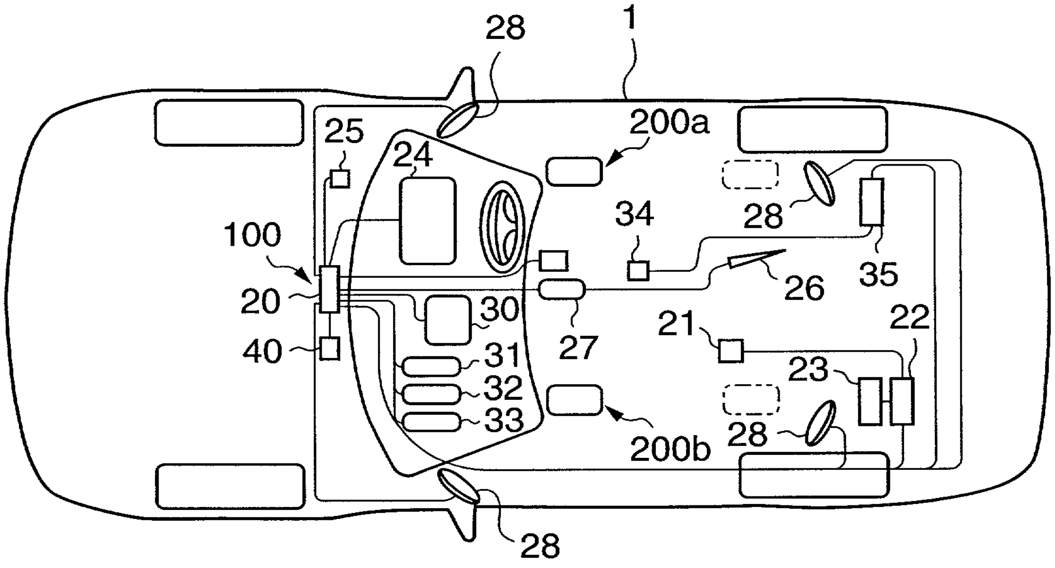

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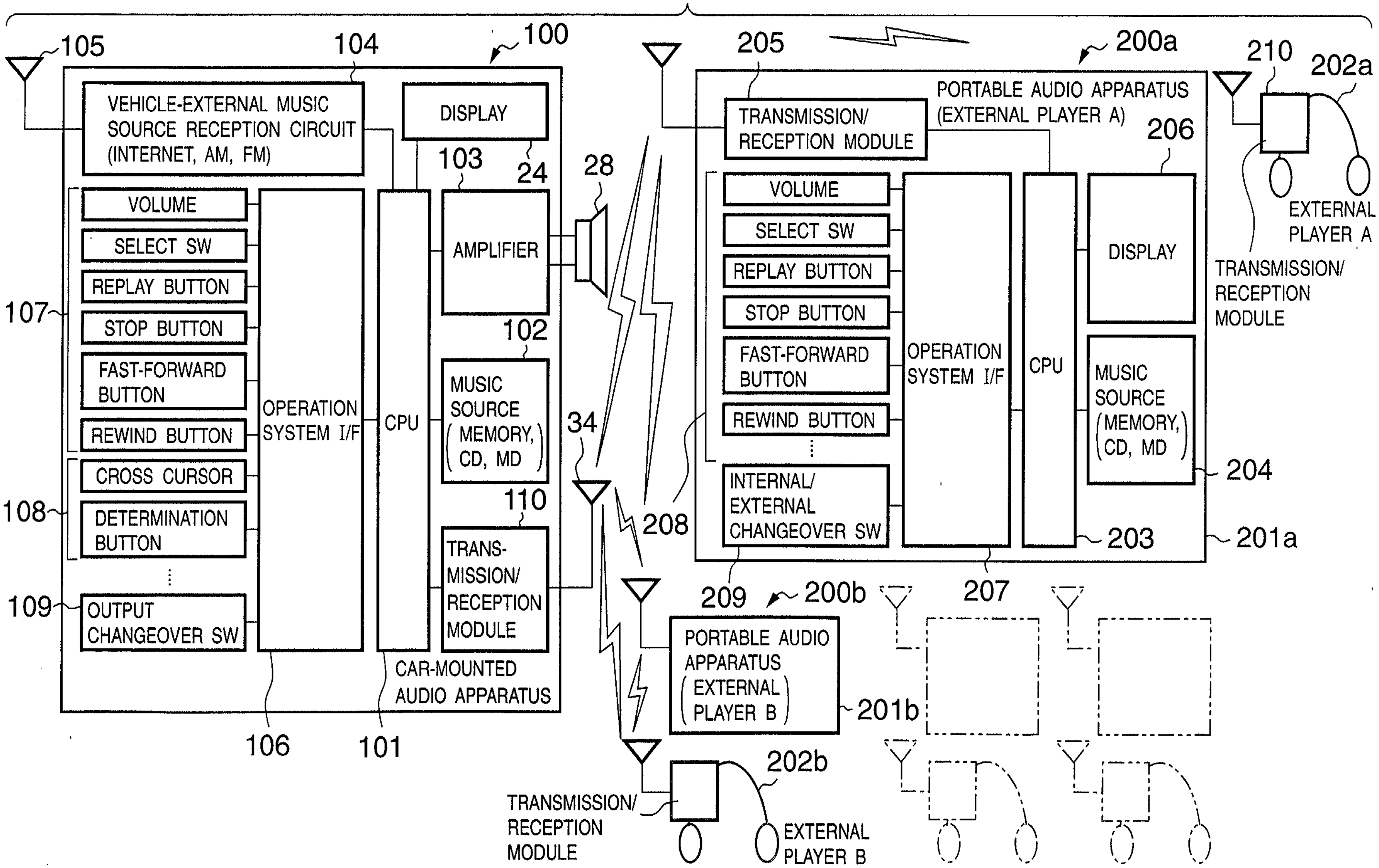
FIG. 2


105
104
100
VEHICLE-EXTERNAL MUSIC SOURCE RECEPTION CIRCUIT (INTERNET, AM, FM)
DISPLAY
103
24
28
VOLUME
SELECT SW
REPLAY BUTTON
STOP BUTTON
FAST-FORWARD BUTTON
REWIND BUTTON
CROSS CURSOR
DETERMINATION BUTTON
OUTPUT CHANGEOVER SW
107
108
109
OPERATION SYSTEM I/F
CPU
AMPLIFIER
102
MUSIC SOURCE (MEMORY, CD, MD)
110
TRANS-MISSION/ RECEPTION MODULE
CAR-MOUNTED AUDIO APPARATUS
106
101
34
205
200a
TRANSMISSION/ RECEPTION MODULE
PORTABLE AUDIO APPARATUS (EXTERNAL PLAYER A)
206
VOLUME
SELECT SW
REPLAY BUTTON
STOP BUTTON
FAST-FORWARD BUTTON
REWIND BUTTON
INTERNAL/ EXTERNAL CHANGEOVER SW
OPERATION SYSTEM I/F
CPU
DISPLAY
MUSIC SOURCE (MEMORY, CD, MD)
208
204
203
201a
209
200b
207
210
202a
EXTERNAL PLAYER A
TRANSMISSION/ RECEPTION MODULE
PORTABLE AUDIO APPARATUS (EXTERNAL PLAYER B)
201b
202b
TRANSMISSION/ RECEPTION MODULE
EXTERNAL PLAYER B

F I G. 3

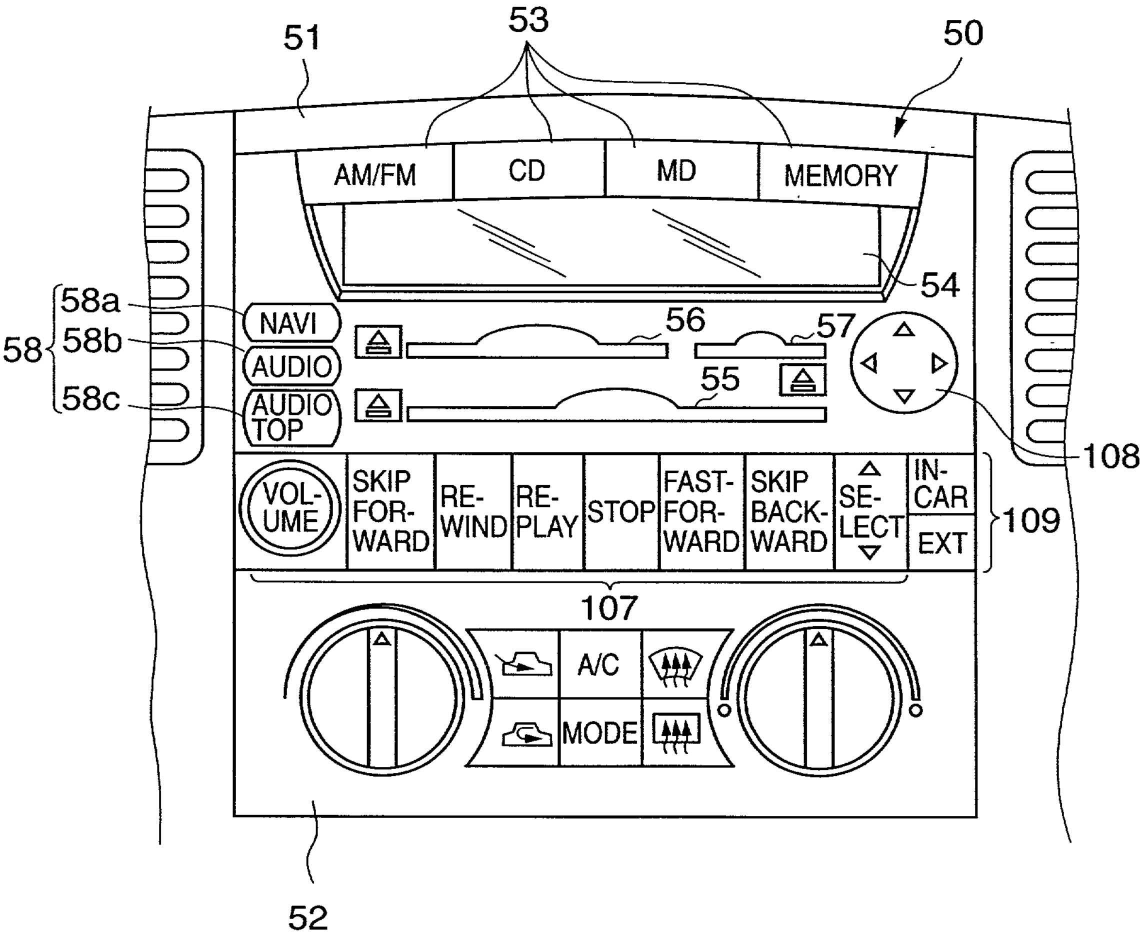

53
51
50
AM/FM
CD
MD
MEMORY
54
58a
NAVI
58
58b
AUDIO
58c
AUDIO TOP
56
57
55
108
VOL-UME
SKIP FOR-WARD
RE-WIND
RE-PLAY
STOP
FAST-FOR-WARD
SKIP BACK-WARD
SE-LECT
IN-CAR
EXT
109
107
A/C
MODE
52

FIG. 4

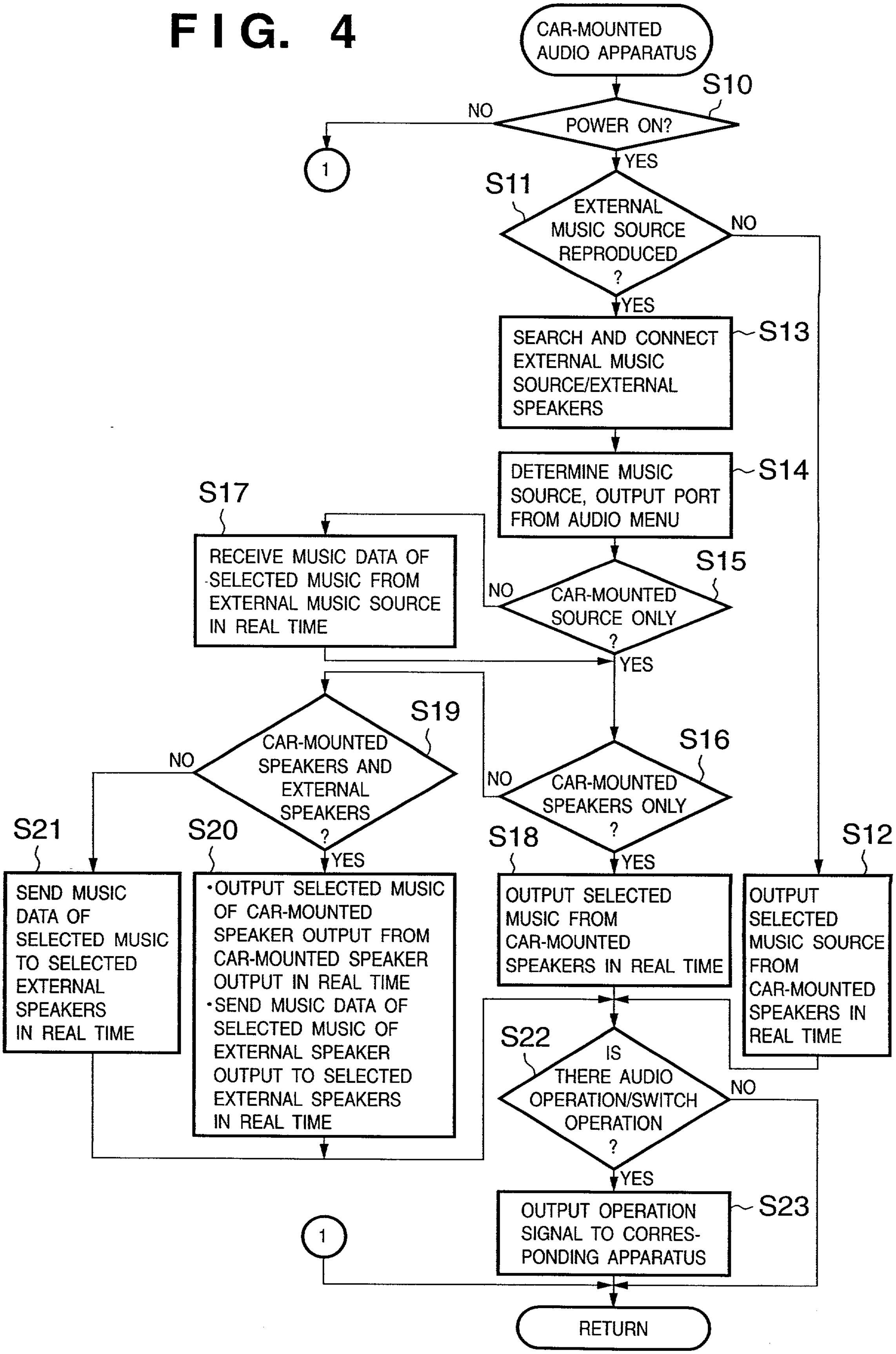

CAR-MOUNTED AUDIO APPARATUS
S10
POWER ON?
NO
YES
1
S11
EXTERNAL MUSIC SOURCE REPRODUCED ?
NO
YES
SEARCH AND CONNECT EXTERNAL MUSIC SOURCE/EXTERNAL SPEAKERS
S13
DETERMINE MUSIC SOURCE, OUTPUT PORT FROM AUDIO MENU
S14
S17
RECEIVE MUSIC DATA OF SELECTED MUSIC FROM EXTERNAL MUSIC SOURCE IN REAL TIME
S15
NO
CAR-MOUNTED SOURCE ONLY ?
YES
S19
NO
CAR-MOUNTED SPEAKERS AND EXTERNAL SPEAKERS ?
YES
S16
NO
CAR-MOUNTED SPEAKERS ONLY ?
YES
S21
SEND MUSIC DATA OF SELECTED MUSIC TO SELECTED EXTERNAL SPEAKERS IN REAL TIME
S20
•OUTPUT SELECTED MUSIC OF CAR-MOUNTED SPEAKER OUTPUT FROM CAR-MOUNTED SPEAKER OUTPUT IN REAL TIME
•SEND MUSIC DATA OF SELECTED MUSIC OF EXTERNAL SPEAKER OUTPUT TO SELECTED EXTERNAL SPEAKERS IN REAL TIME
S18
OUTPUT SELECTED MUSIC FROM CAR-MOUNTED SPEAKERS IN REAL TIME
S12
OUTPUT SELECTED MUSIC SOURCE FROM CAR-MOUNTED SPEAKERS IN REAL TIME
S22
IS THERE AUDIO OPERATION/SWITCH OPERATION ?
NO
YES
OUTPUT OPERATION SIGNAL TO CORRESPONDING APPARATUS
S23
1
RETURN

FIG. 5

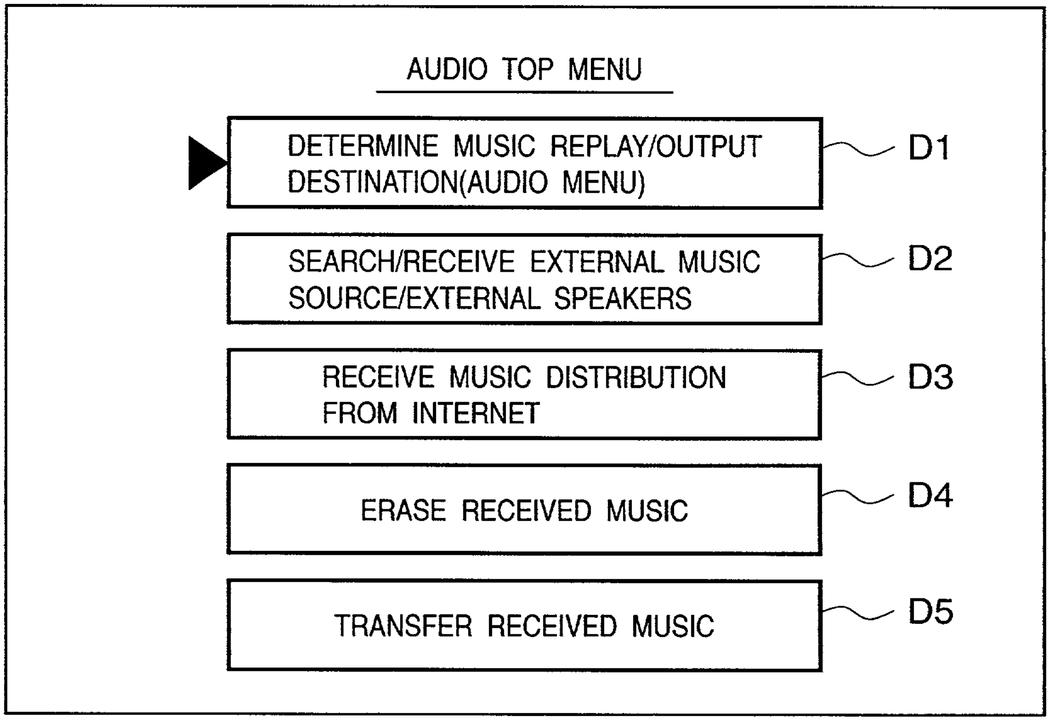

AUDIO TOP MENU
DETERMINE MUSIC REPLAY/OUTPUT DESTINATION(AUDIO MENU)
D1
SEARCH/RECEIVE EXTERNAL MUSIC SOURCE/EXTERNAL SPEAKERS
D2
RECEIVE MUSIC DISTRIBUTION FROM INTERNET
D3
ERASE RECEIVED MUSIC
D4
TRANSFER RECEIVED MUSIC
D5

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FIG. 6

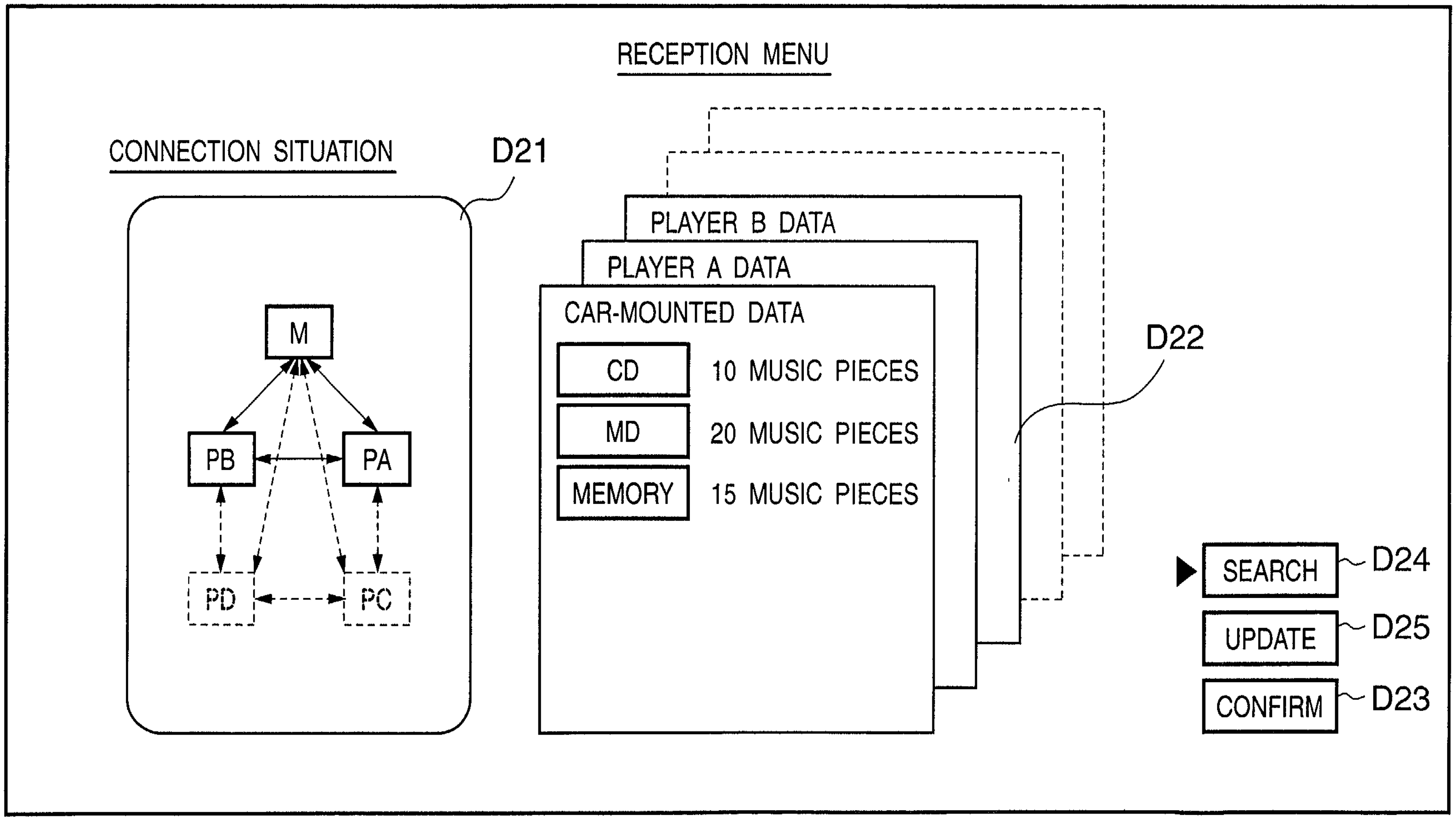

RECEPTION MENU
CONNECTION SITUATION
D21
M
PB
PA
PD
PC
PLAYER B DATA
PLAYER A DATA
CAR-MOUNTED DATA
CD
10 MUSIC PIECES
MD
20 MUSIC PIECES
MEMORY
15 MUSIC PIECES
D22
SEARCH
D24
UPDATE
D25
CONFIRM
D23

FIG. 7

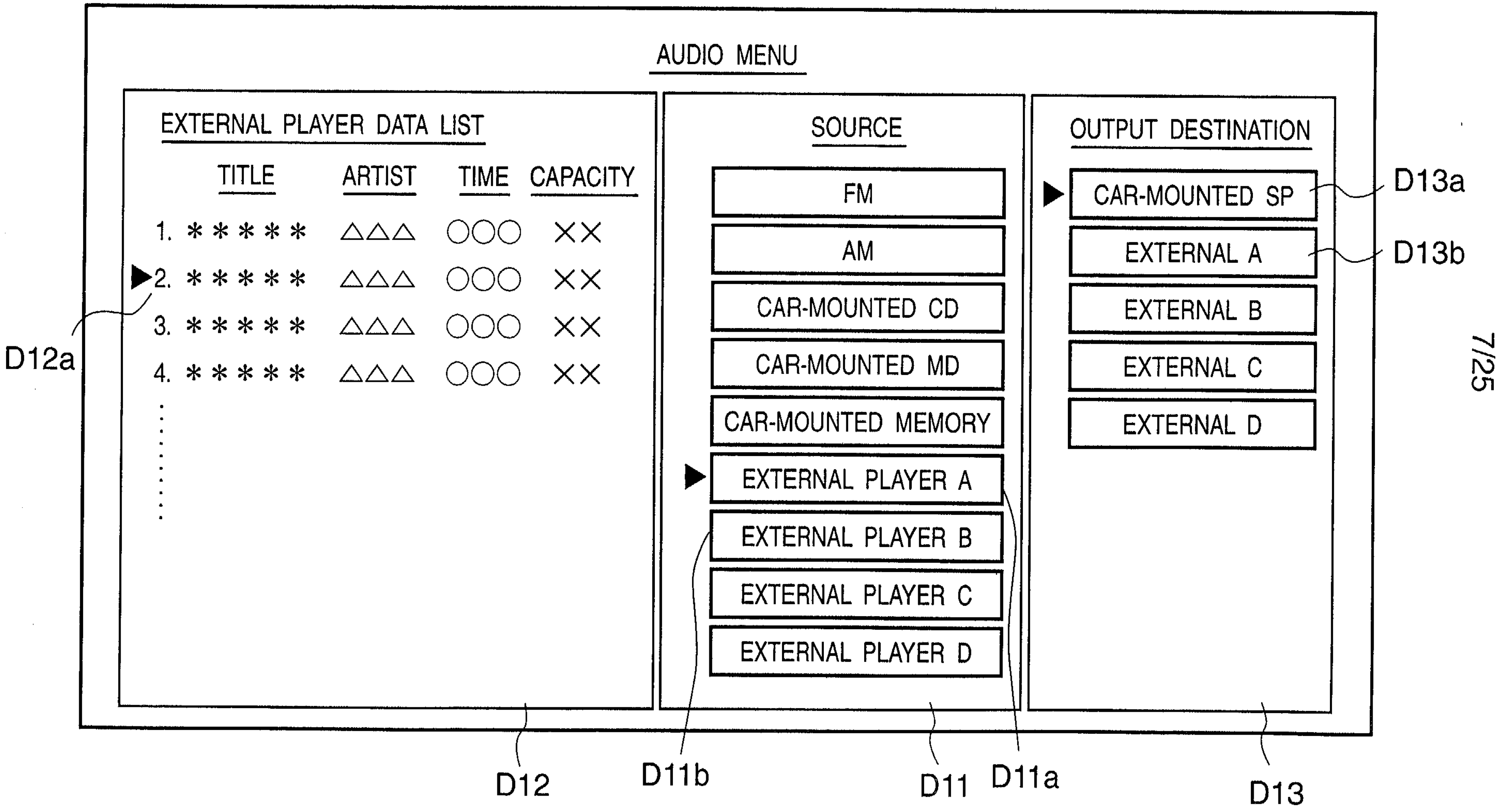

AUDIO MENU
EXTERNAL PLAYER DATA LIST
TITLE
ARTIST
TIME
CAPACITY
1. ＊＊＊＊＊ △△△ ○○○ ××
▶2. ＊＊＊＊＊ △△△ ○○○ ××
3. ＊＊＊＊＊ △△△ ○○○ ××
4. ＊＊＊＊＊ △△△ ○○○ ××
SOURCE
FM
AM
CAR-MOUNTED CD
CAR-MOUNTED MD
CAR-MOUNTED MEMORY
▶ EXTERNAL PLAYER A
EXTERNAL PLAYER B
EXTERNAL PLAYER C
EXTERNAL PLAYER D
OUTPUT DESTINATION
▶ CAR-MOUNTED SP
EXTERNAL A
EXTERNAL B
EXTERNAL C
EXTERNAL D
D13a
D13b
D12a
D12
D11b
D11
D11a
D13

FIG. 8

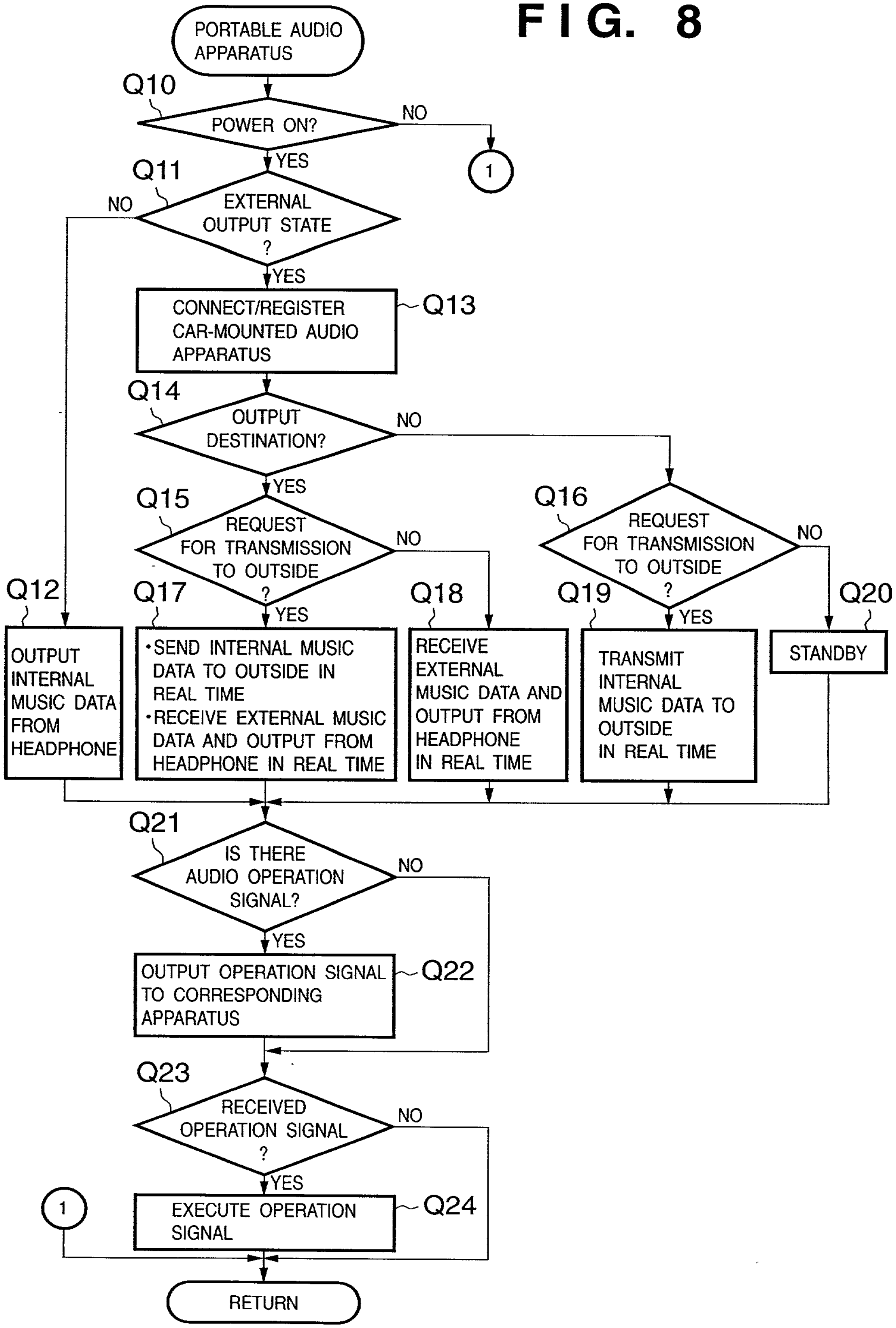

PORTABLE AUDIO APPARATUS
Q10
POWER ON?
NO
YES
1
Q11
EXTERNAL OUTPUT STATE ?
NO
YES
CONNECT/REGISTER CAR-MOUNTED AUDIO APPARATUS
Q13
Q14
OUTPUT DESTINATION?
NO
YES
Q15
REQUEST FOR TRANSMISSION TO OUTSIDE ?
NO
YES
Q16
REQUEST FOR TRANSMISSION TO OUTSIDE ?
NO
YES
Q12
OUTPUT INTERNAL MUSIC DATA FROM HEADPHONE
Q17
•SEND INTERNAL MUSIC DATA TO OUTSIDE IN REAL TIME
•RECEIVE EXTERNAL MUSIC DATA AND OUTPUT FROM HEADPHONE IN REAL TIME
Q18
RECEIVE EXTERNAL MUSIC DATA AND OUTPUT FROM HEADPHONE IN REAL TIME
Q19
TRANSMIT INTERNAL MUSIC DATA TO OUTSIDE IN REAL TIME
Q20
STANDBY
Q21
IS THERE AUDIO OPERATION SIGNAL?
NO
YES
OUTPUT OPERATION SIGNAL TO CORRESPONDING APPARATUS
Q22
Q23
RECEIVED OPERATION SIGNAL ?
NO
YES
1
EXECUTE OPERATION SIGNAL
Q24
RETURN

FIG. 9

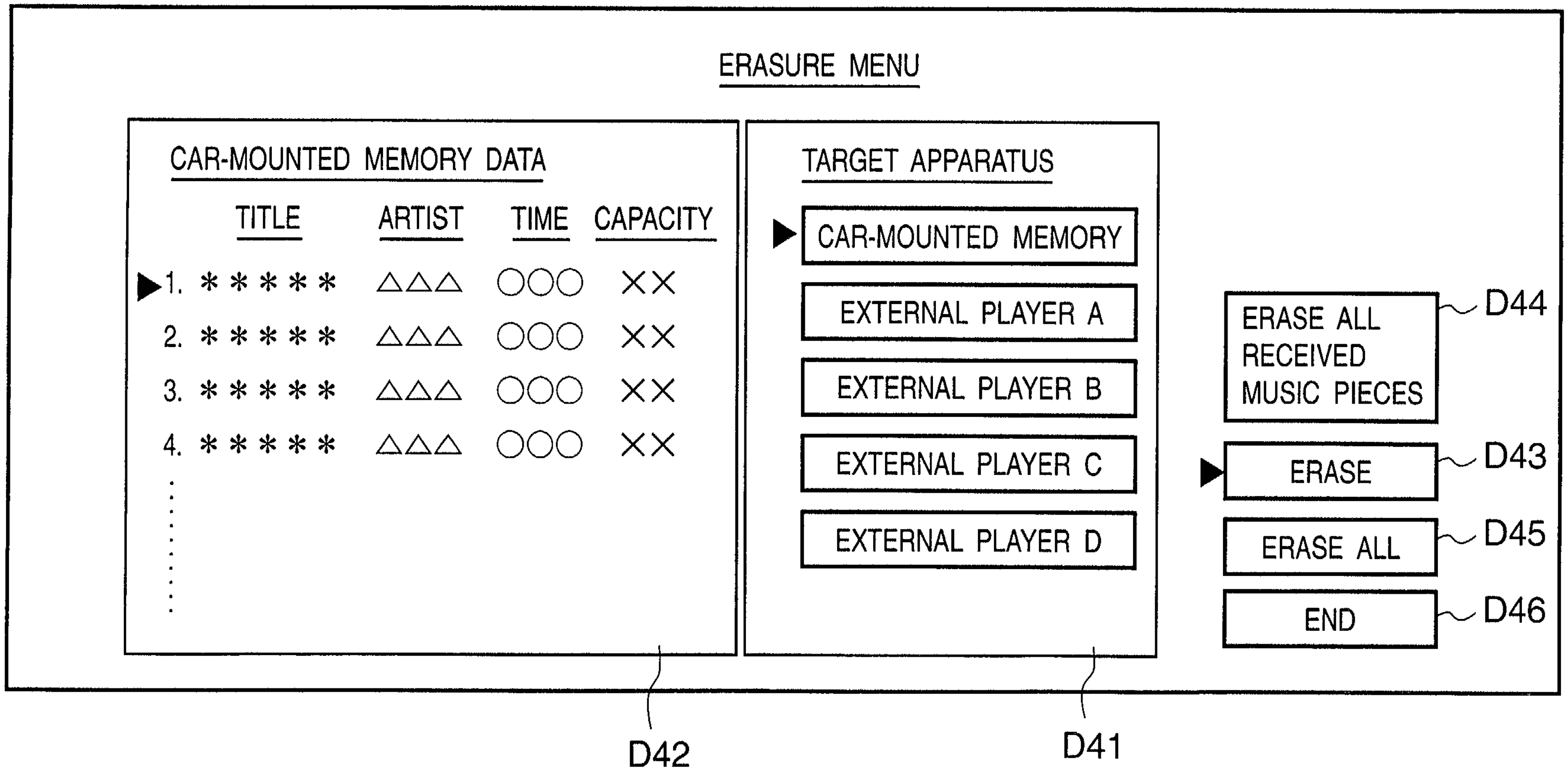
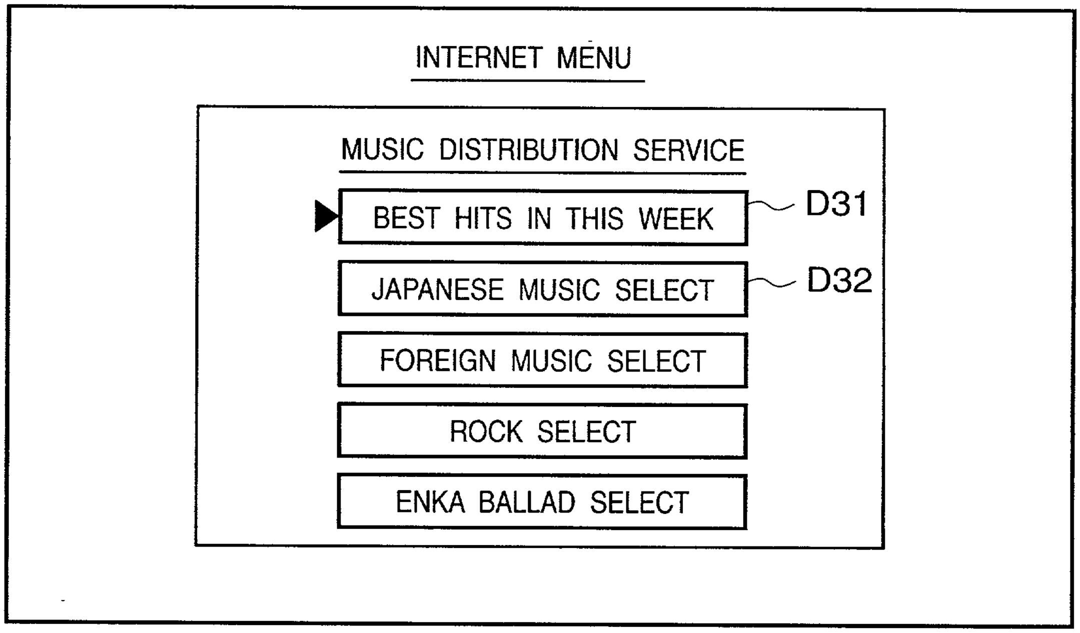

ERASURE MENU
CAR-MOUNTED MEMORY DATA
TITLE
ARTIST
TIME
CAPACITY
1. ＊＊＊＊＊ △△△ ○○○ ××
2. ＊＊＊＊＊ △△△ ○○○ ××
3. ＊＊＊＊＊ △△△ ○○○ ××
4. ＊＊＊＊＊ △△△ ○○○ ××
TARGET APPARATUS
CAR-MOUNTED MEMORY
EXTERNAL PLAYER A
EXTERNAL PLAYER B
EXTERNAL PLAYER C
EXTERNAL PLAYER D
ERASE ALL RECEIVED MUSIC PIECES
ERASE
ERASE ALL
END
D44
D43
D45
D46
D42
D41

FIG. 10


INTERNET MENU
MUSIC DISTRIBUTION SERVICE
BEST HITS IN THIS WEEK
D31
JAPANESE MUSIC SELECT
D32
FOREIGN MUSIC SELECT
ROCK SELECT
ENKA BALLAD SELECT

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F I G. 11

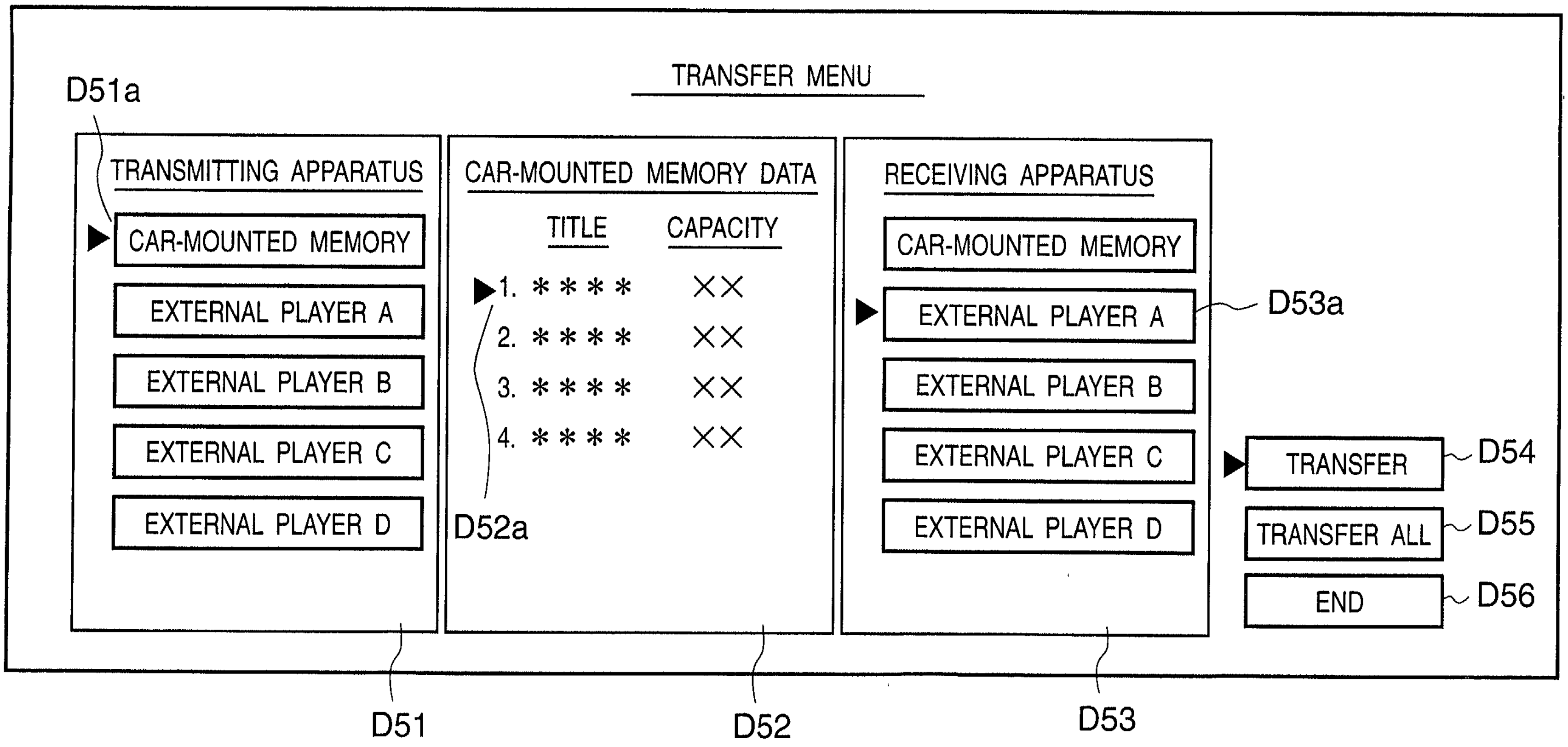
TRANSFER MENU
D51a
TRANSMITTING APPARATUS
CAR-MOUNTED MEMORY
EXTERNAL PLAYER A
EXTERNAL PLAYER B
EXTERNAL PLAYER C
EXTERNAL PLAYER D
D51
CAR-MOUNTED MEMORY DATA
TITLE
CAPACITY
1. ＊＊＊＊ ××
2. ＊＊＊＊ ××
3. ＊＊＊＊ ××
4. ＊＊＊＊ ××
D52a
D52
RECEIVING APPARATUS
CAR-MOUNTED MEMORY
EXTERNAL PLAYER A
EXTERNAL PLAYER B
EXTERNAL PLAYER C
EXTERNAL PLAYER D
D53a
D53
TRANSFER
D54
TRANSFER ALL
D55
END
D56

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FIG. 12

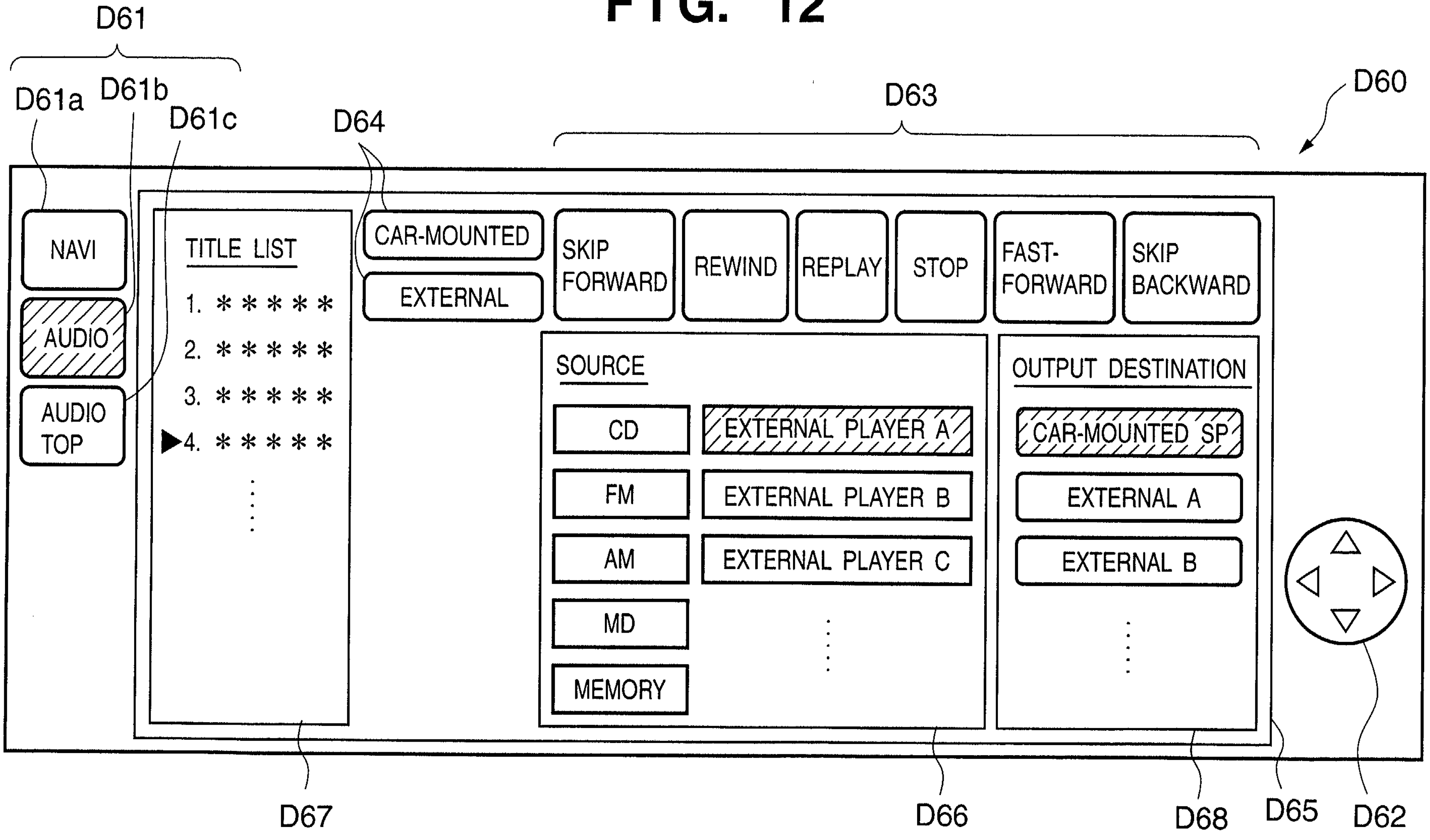

D61
D61a
D61b
D61c
D64
D63
D60
NAVI
AUDIO
AUDIO TOP
TITLE LIST
1. * * * * *
2. * * * * *
3. * * * * *
▶4. * * * * *
CAR-MOUNTED
EXTERNAL
SKIP FORWARD
REWIND
REPLAY
STOP
FAST-FORWARD
SKIP BACKWARD
SOURCE
CD
FM
AM
MD
MEMORY
EXTERNAL PLAYER A
EXTERNAL PLAYER B
EXTERNAL PLAYER C
OUTPUT DESTINATION
CAR-MOUNTED SP
EXTERNAL A
EXTERNAL B
D67
D66
D68
D65
D62

FIG. 13

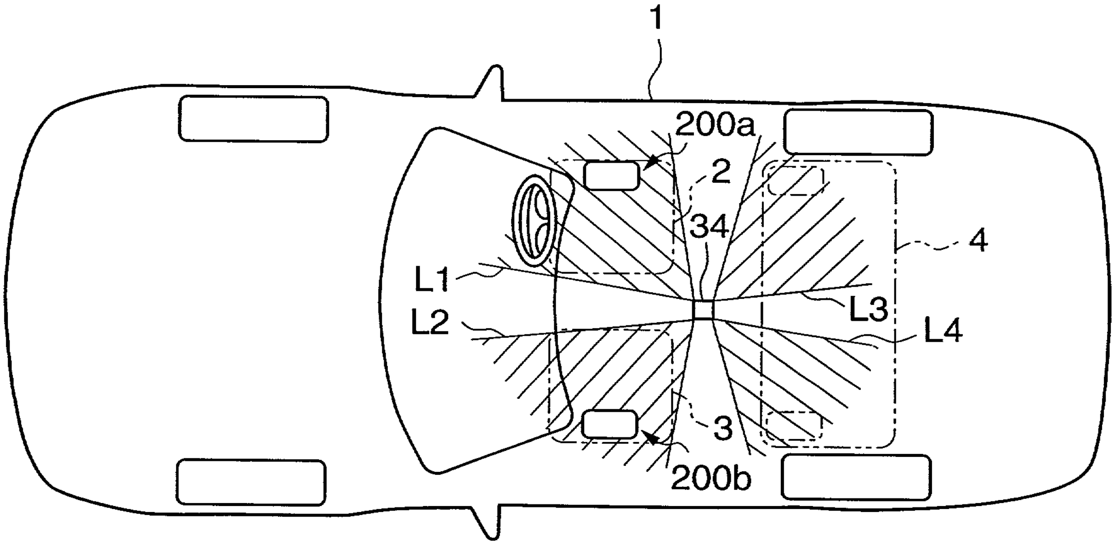
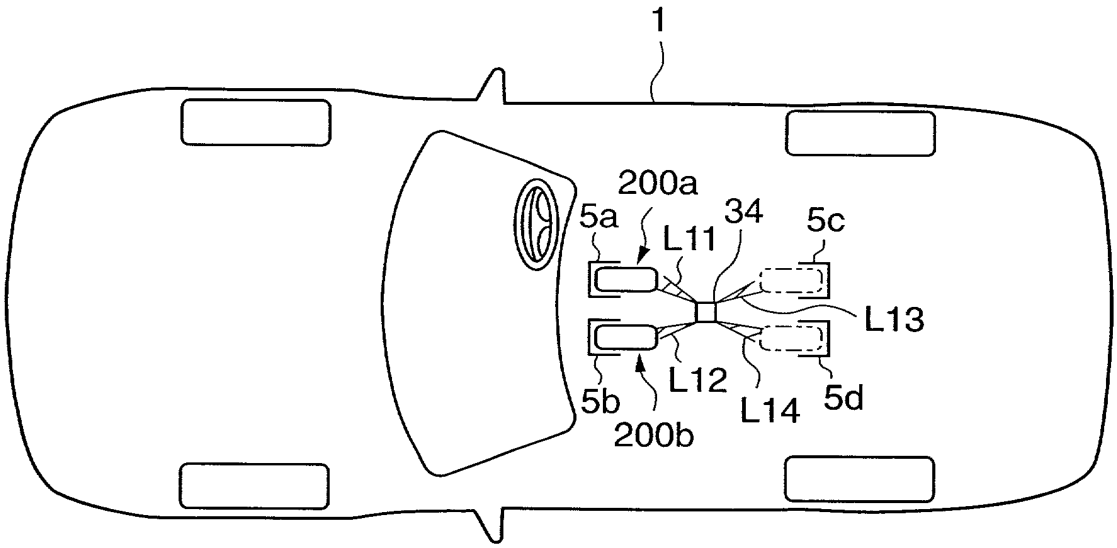
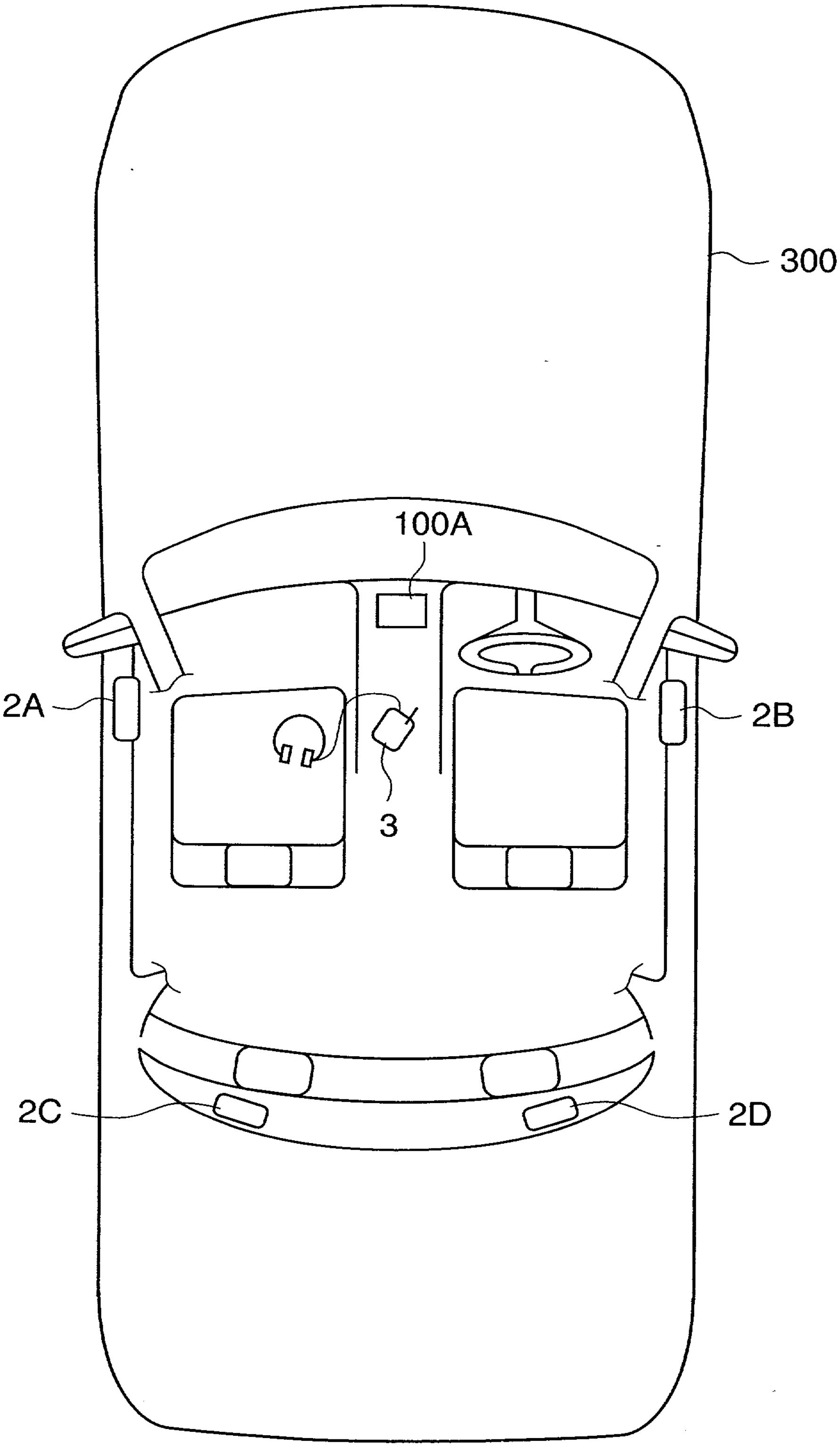

1
200a
2
34
4
L1
L2
L3
L4
3
200b

FIG. 14


1
200a
5a
L11
34
5c
L13
L12
L14
5d
5b
200b

F I G. 15


300
100A
2A
2B
3
2C
2D

104040.74452960

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FIG. 16

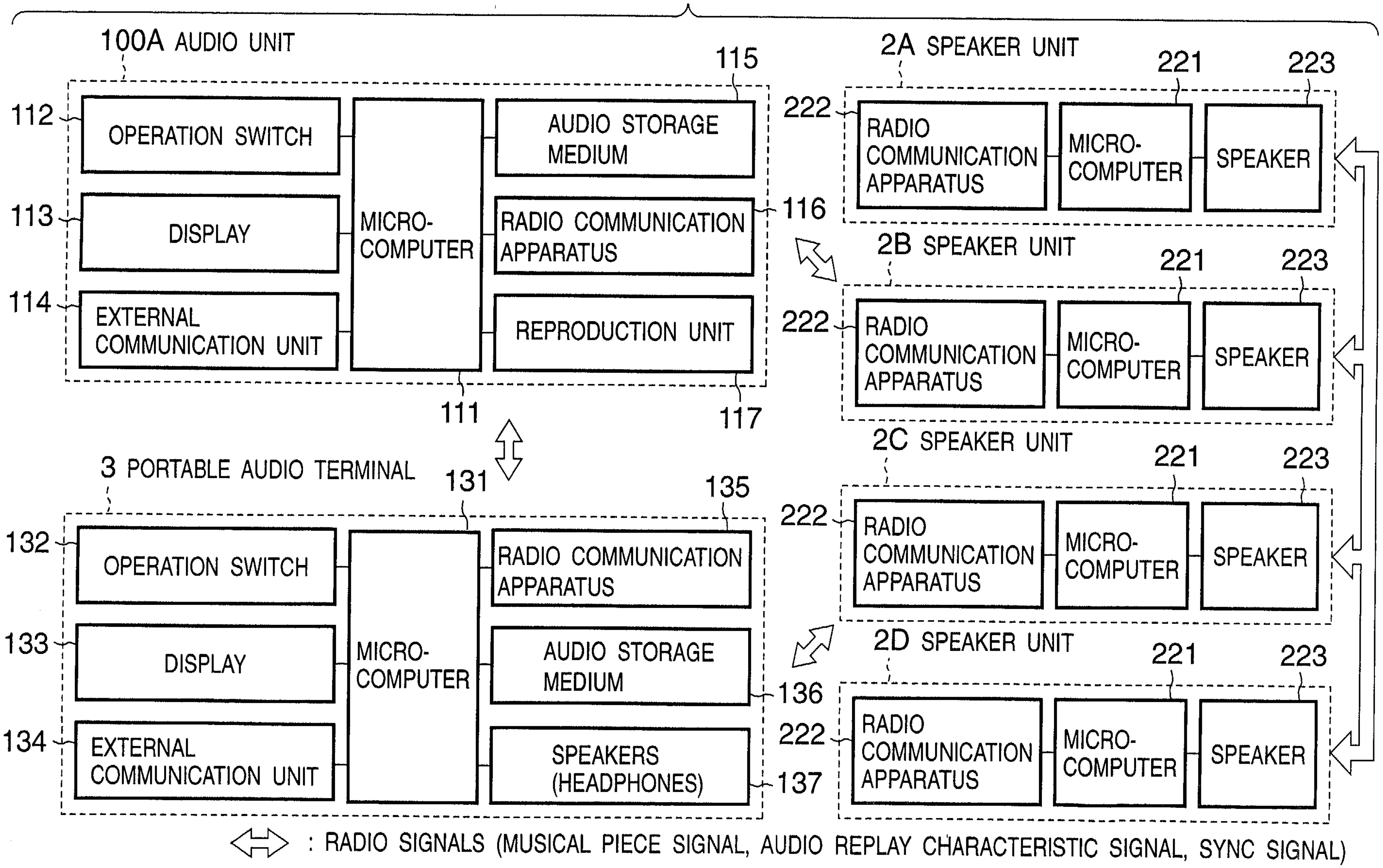
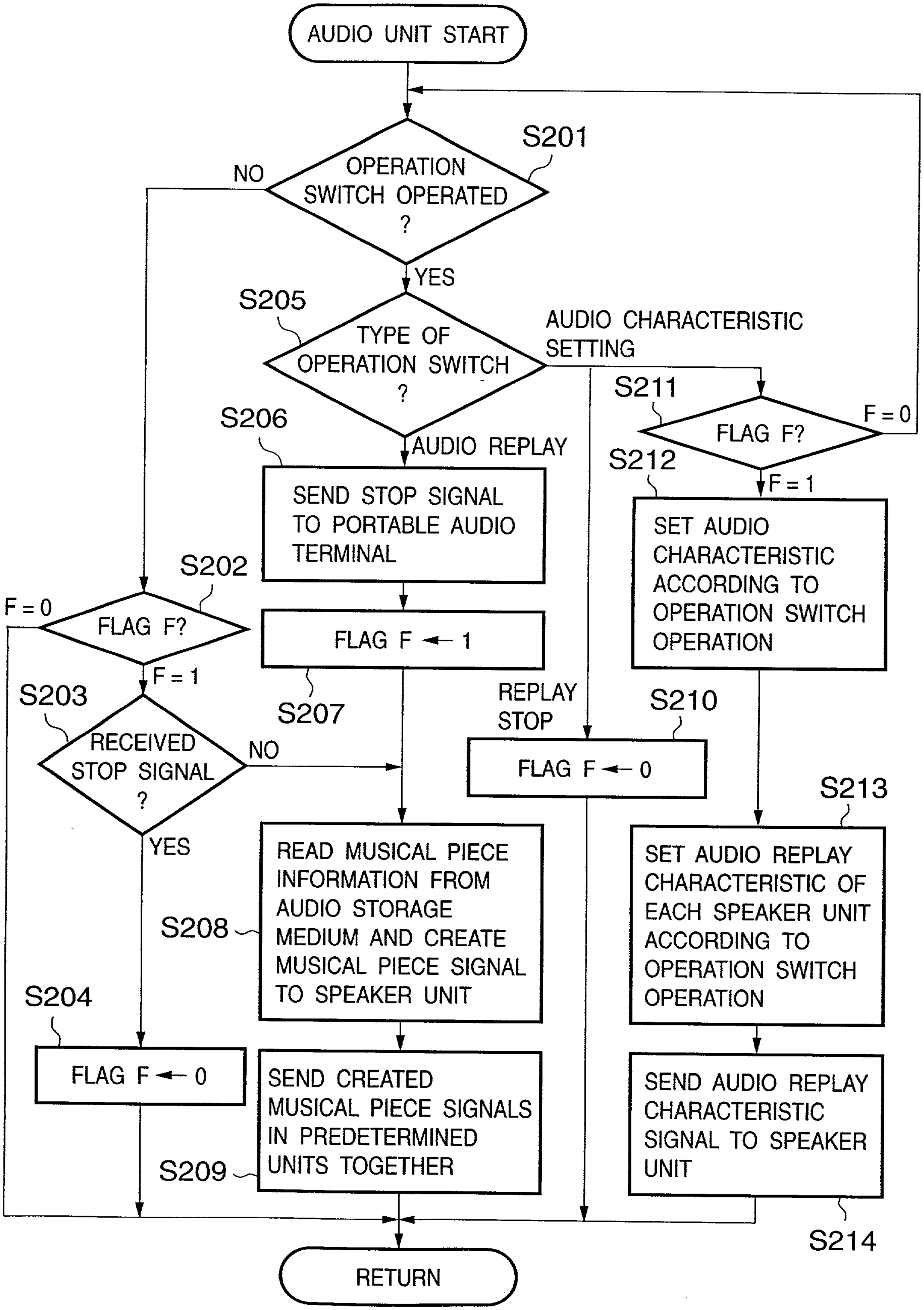
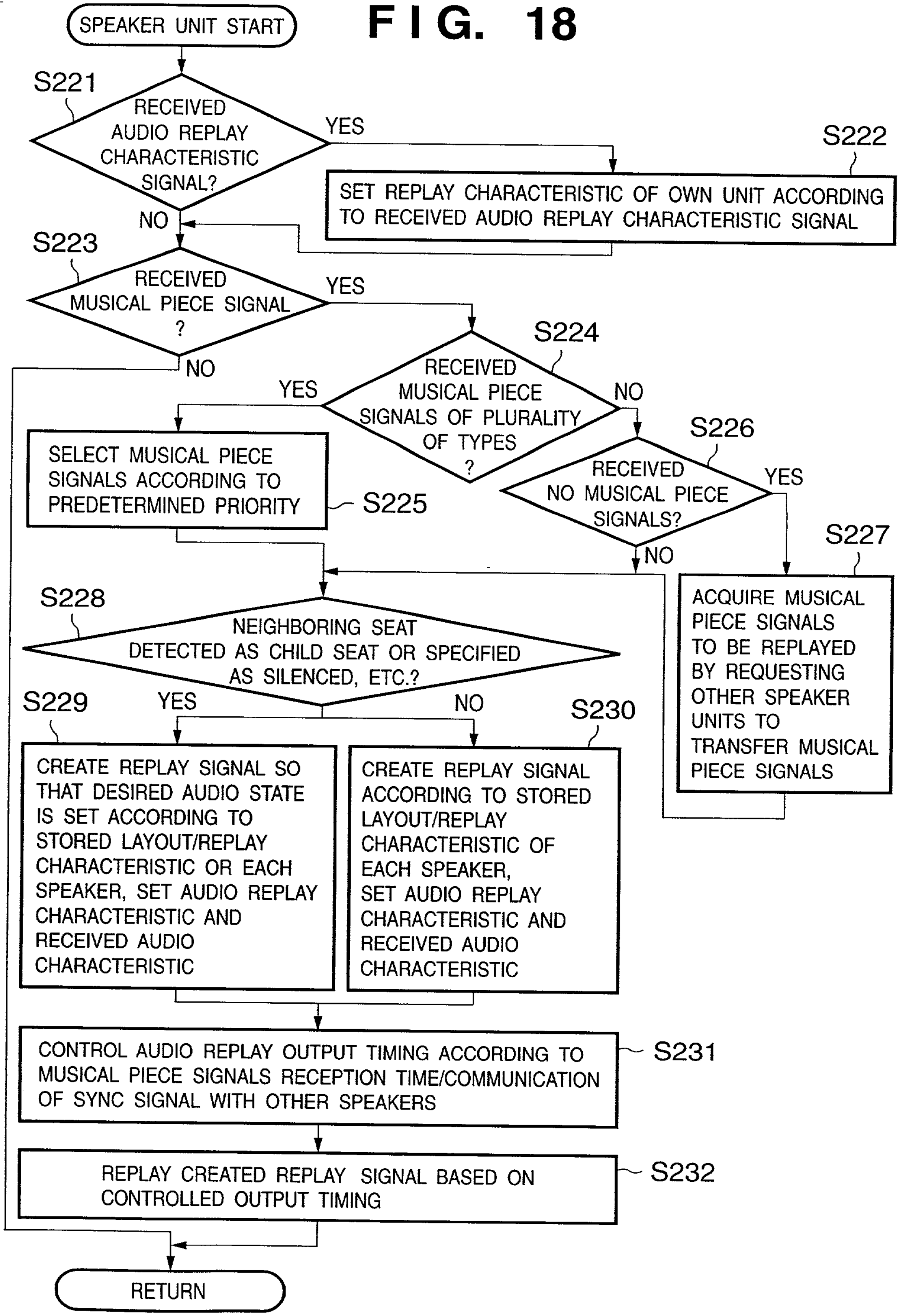

100A AUDIO UNIT
112
OPERATION SWITCH
113
DISPLAY
114
EXTERNAL COMMUNICATION UNIT
MICRO-COMPUTER
111
115
AUDIO STORAGE MEDIUM
116
RADIO COMMUNICATION APPARATUS
117
REPRODUCTION UNIT
3 PORTABLE AUDIO TERMINAL
131
132
OPERATION SWITCH
133
DISPLAY
134
EXTERNAL COMMUNICATION UNIT
MICRO-COMPUTER
135
RADIO COMMUNICATION APPARATUS
136
AUDIO STORAGE MEDIUM
137
SPEAKERS (HEADPHONES)
2A SPEAKER UNIT
2B SPEAKER UNIT
2C SPEAKER UNIT
2D SPEAKER UNIT
222
RADIO COMMUNICATION APPARATUS
221
MICRO-COMPUTER
223
SPEAKER
⇔ : RADIO SIGNALS (MUSICAL PIECE SIGNAL, AUDIO REPLAY CHARACTERISTIC SIGNAL, SYNC SIGNAL)

FIG. 17


AUDIO UNIT START
S201
OPERATION SWITCH OPERATED ?
NO
YES
S205
TYPE OF OPERATION SWITCH ?
AUDIO CHARACTERISTIC SETTING
AUDIO REPLAY
REPLAY STOP
S206
SEND STOP SIGNAL TO PORTABLE AUDIO TERMINAL
S207
FLAG F ← 1
S202
FLAG F?
F = 0
F = 1
S203
RECEIVED STOP SIGNAL ?
NO
YES
S204
FLAG F ← 0
S208
READ MUSICAL PIECE INFORMATION FROM AUDIO STORAGE MEDIUM AND CREATE MUSICAL PIECE SIGNAL TO SPEAKER UNIT
S209
SEND CREATED MUSICAL PIECE SIGNALS IN PREDETERMINED UNITS TOGETHER
S211
FLAG F?
F = 0
F = 1
S212
SET AUDIO CHARACTERISTIC ACCORDING TO OPERATION SWITCH OPERATION
S210
FLAG F ← 0
S213
SET AUDIO REPLAY CHARACTERISTIC OF EACH SPEAKER UNIT ACCORDING TO OPERATION SWITCH OPERATION
S214
SEND AUDIO REPLAY CHARACTERISTIC SIGNAL TO SPEAKER UNIT
RETURN

F I G. 18


SPEAKER UNIT START
S221
RECEIVED AUDIO REPLAY CHARACTERISTIC SIGNAL?
YES
NO
S222
SET REPLAY CHARACTERISTIC OF OWN UNIT ACCORDING TO RECEIVED AUDIO REPLAY CHARACTERISTIC SIGNAL
S223
RECEIVED MUSICAL PIECE SIGNAL ?
YES
NO
S224
RECEIVED MUSICAL PIECE SIGNALS OF PLURALITY OF TYPES ?
YES
NO
SELECT MUSICAL PIECE SIGNALS ACCORDING TO PREDETERMINED PRIORITY
S225
S226
RECEIVED NO MUSICAL PIECE SIGNALS?
YES
NO
S227
ACQUIRE MUSICAL PIECE SIGNALS TO BE REPLAYED BY REQUESTING OTHER SPEAKER UNITS TO TRANSFER MUSICAL PIECE SIGNALS
S228
NEIGHBORING SEAT DETECTED AS CHILD SEAT OR SPECIFIED AS SILENCED, ETC.?
S229
YES
NO
S230
CREATE REPLAY SIGNAL SO THAT DESIRED AUDIO STATE IS SET ACCORDING TO STORED LAYOUT/REPLAY CHARACTERISTIC OR EACH SPEAKER, SET AUDIO REPLAY CHARACTERISTIC AND RECEIVED AUDIO CHARACTERISTIC
CREATE REPLAY SIGNAL ACCORDING TO STORED LAYOUT/REPLAY CHARACTERISTIC OF EACH SPEAKER, SET AUDIO REPLAY CHARACTERISTIC AND RECEIVED AUDIO CHARACTERISTIC
CONTROL AUDIO REPLAY OUTPUT TIMING ACCORDING TO MUSICAL PIECE SIGNALS RECEPTION TIME/COMMUNICATION OF SYNC SIGNAL WITH OTHER SPEAKERS
S231
REPLAY CREATED REPLAY SIGNAL BASED ON CONTROLLED OUTPUT TIMING
S232
RETURN

F I G. 19A

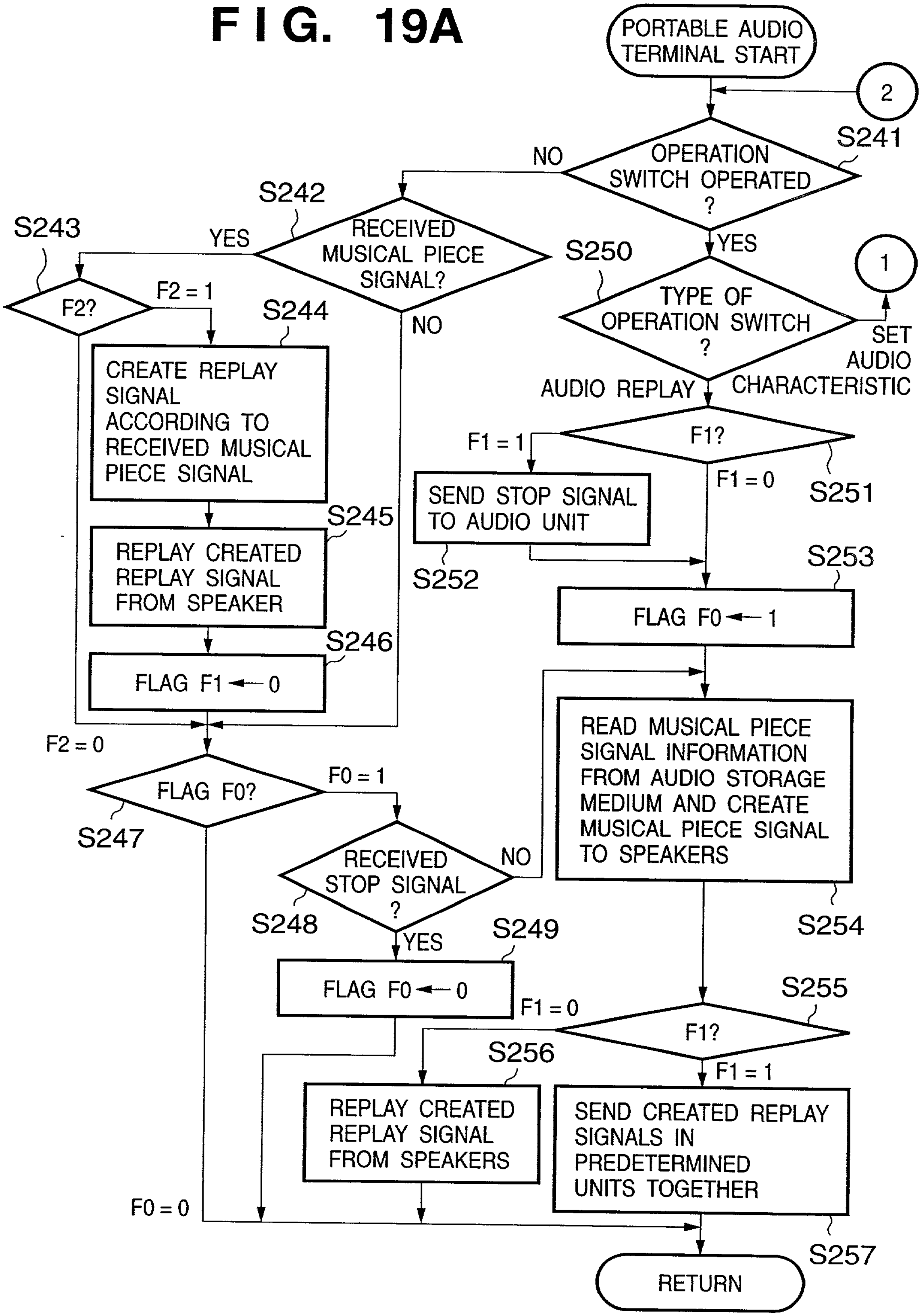

PORTABLE AUDIO TERMINAL START
2
S241
OPERATION SWITCH OPERATED ?
NO
YES
S242
RECEIVED MUSICAL PIECE SIGNAL?
YES
NO
S243
F2?
F2 = 1
F2 = 0
S244
CREATE REPLAY SIGNAL ACCORDING TO RECEIVED MUSICAL PIECE SIGNAL
S245
REPLAY CREATED REPLAY SIGNAL FROM SPEAKER
S246
FLAG F1 ← 0
S247
FLAG F0?
F0 = 1
F0 = 0
S248
RECEIVED STOP SIGNAL ?
NO
YES
S249
FLAG F0 ← 0
S250
TYPE OF OPERATION SWITCH ?
1
SET AUDIO CHARACTERISTIC
AUDIO REPLAY
S251
F1?
F1 = 1
F1 = 0
S252
SEND STOP SIGNAL TO AUDIO UNIT
S253
FLAG F0 ← 1
S254
READ MUSICAL PIECE SIGNAL INFORMATION FROM AUDIO STORAGE MEDIUM AND CREATE MUSICAL PIECE SIGNAL TO SPEAKERS
S255
F1?
F1 = 0
F1 = 1
S256
REPLAY CREATED REPLAY SIGNAL FROM SPEAKERS
SEND CREATED REPLAY SIGNALS IN PREDETERMINED UNITS TOGETHER
S257
RETURN

FIG. 19B

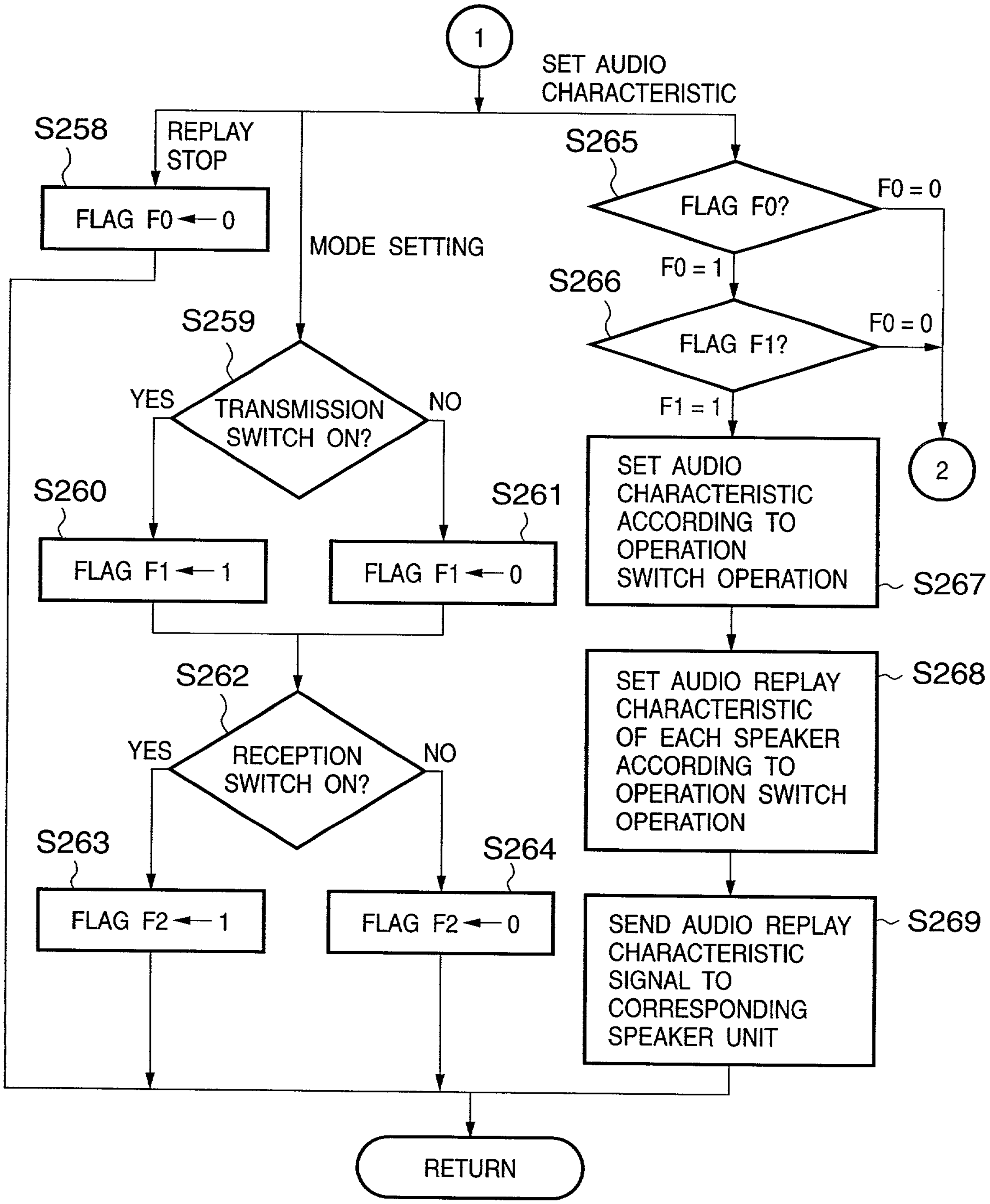

1
SET AUDIO CHARACTERISTIC
S258
REPLAY STOP
FLAG F0 ← 0
MODE SETTING
S259
TRANSMISSION SWITCH ON?
YES
NO
S260
FLAG F1 ← 1
S261
FLAG F1 ← 0
S262
RECEPTION SWITCH ON?
YES
NO
S263
FLAG F2 ← 1
S264
FLAG F2 ← 0
S265
FLAG F0?
F0 = 0
F0 = 1
S266
FLAG F1?
F0 = 0
F1 = 1
2
SET AUDIO CHARACTERISTIC ACCORDING TO OPERATION SWITCH OPERATION
S267
SET AUDIO REPLAY CHARACTERISTIC OF EACH SPEAKER ACCORDING TO OPERATION SWITCH OPERATION
S268
SEND AUDIO REPLAY CHARACTERISTIC SIGNAL TO CORRESPONDING SPEAKER UNIT
S269
RETURN

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FIG. 20

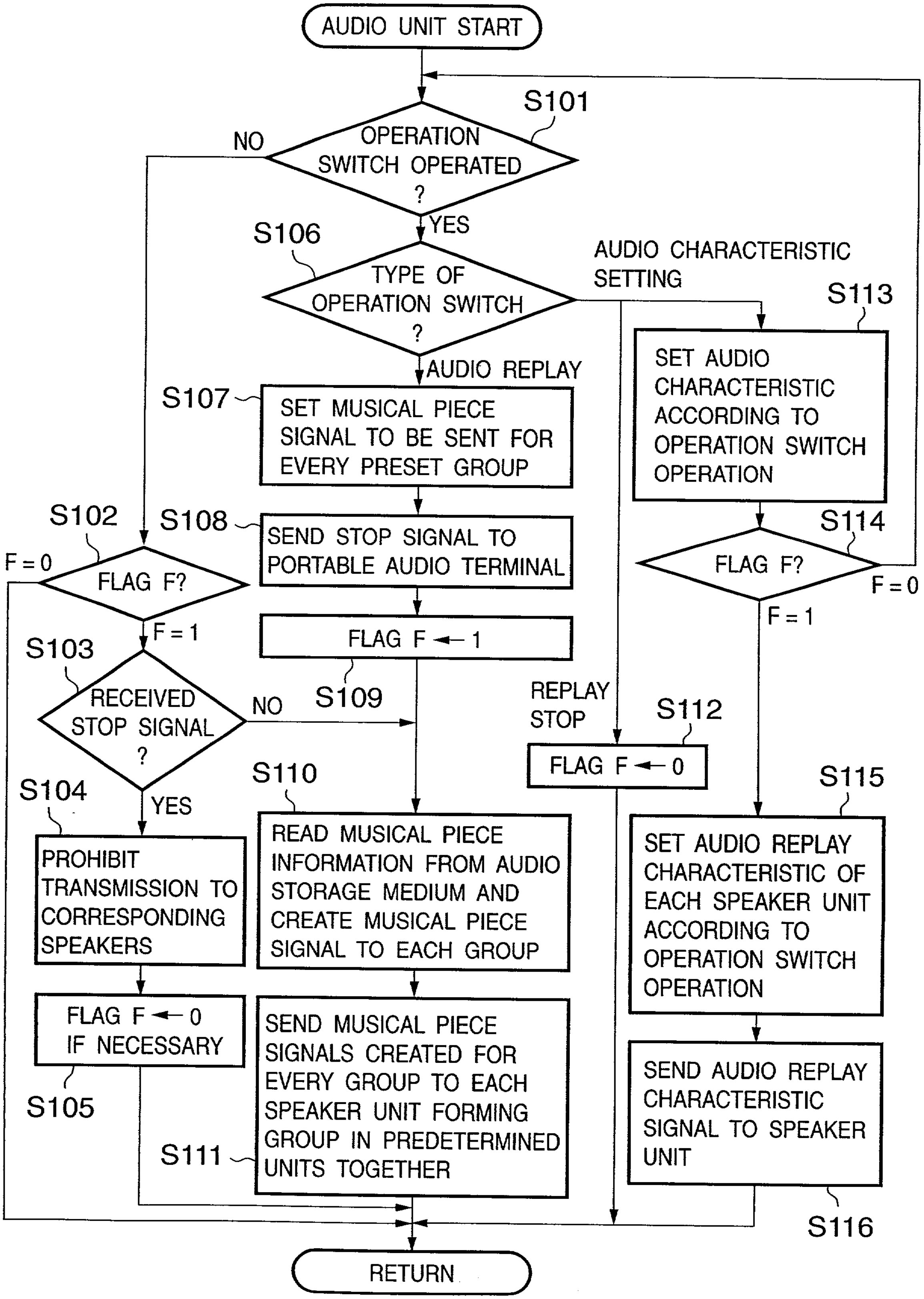
AUDIO UNIT START
S101
OPERATION SWITCH OPERATED ?
NO
YES
S106
TYPE OF OPERATION SWITCH ?
AUDIO REPLAY
AUDIO CHARACTERISTIC SETTING
S107
SET MUSICAL PIECE SIGNAL TO BE SENT FOR EVERY PRESET GROUP
S108
SEND STOP SIGNAL TO PORTABLE AUDIO TERMINAL
FLAG F ← 1
S109
S102
FLAG F?
F = 0
F = 1
S103
RECEIVED STOP SIGNAL ?
NO
YES
S104
PROHIBIT TRANSMISSION TO CORRESPONDING SPEAKERS
FLAG F ← 0 IF NECESSARY
S105
S110
READ MUSICAL PIECE INFORMATION FROM AUDIO STORAGE MEDIUM AND CREATE MUSICAL PIECE SIGNAL TO EACH GROUP
S111
SEND MUSICAL PIECE SIGNALS CREATED FOR EVERY GROUP TO EACH SPEAKER UNIT FORMING GROUP IN PREDETERMINED UNITS TOGETHER
REPLAY STOP
S112
FLAG F ← 0
S113
SET AUDIO CHARACTERISTIC ACCORDING TO OPERATION SWITCH OPERATION
S114
FLAG F?
F = 0
F = 1
S115
SET AUDIO REPLAY CHARACTERISTIC OF EACH SPEAKER UNIT ACCORDING TO OPERATION SWITCH OPERATION
SEND AUDIO REPLAY CHARACTERISTIC SIGNAL TO SPEAKER UNIT
S116
RETURN

FIG. 21

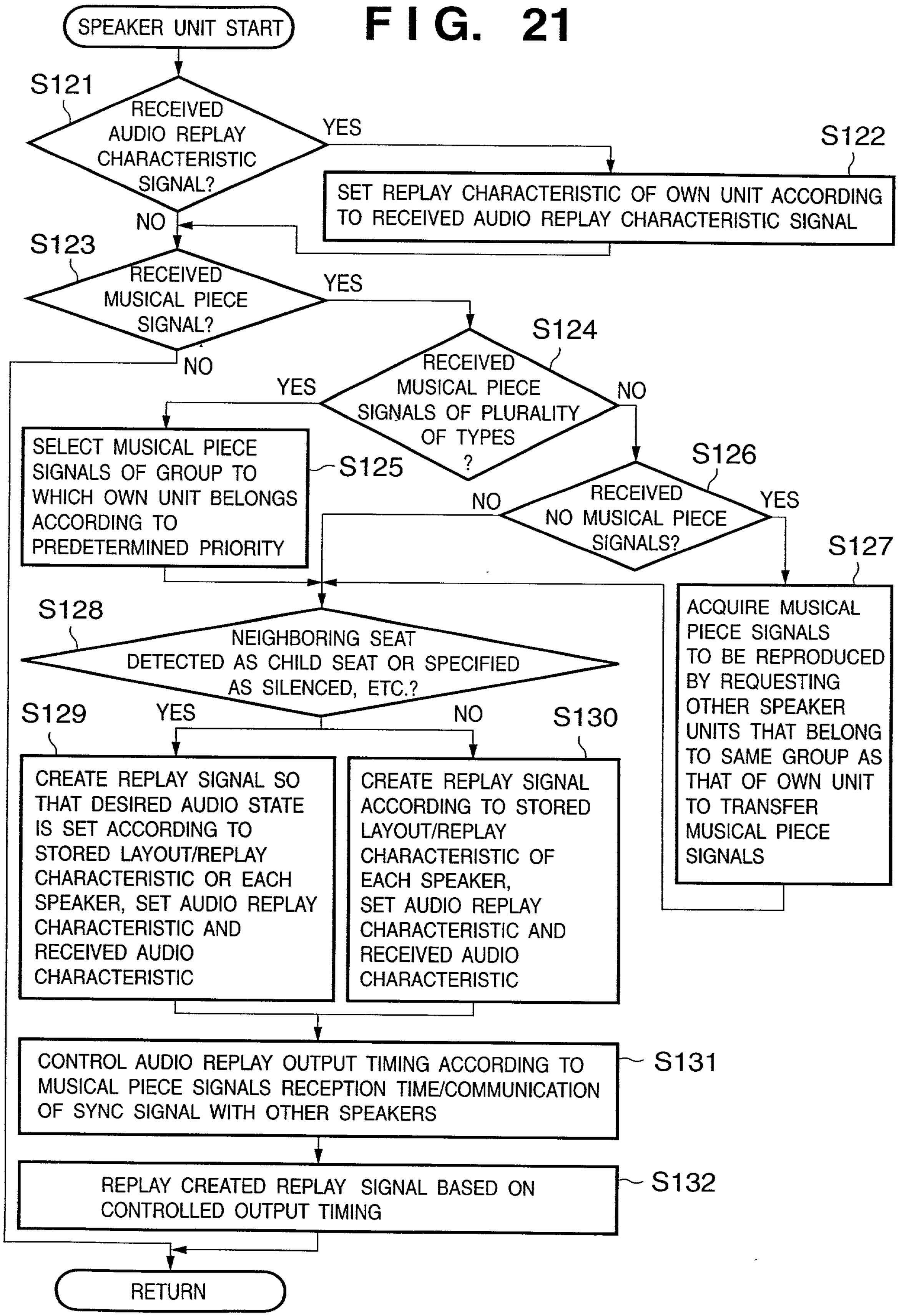
SPEAKER UNIT START
S121
RECEIVED AUDIO REPLAY CHARACTERISTIC SIGNAL?
YES
NO
S122
SET REPLAY CHARACTERISTIC OF OWN UNIT ACCORDING TO RECEIVED AUDIO REPLAY CHARACTERISTIC SIGNAL
S123
RECEIVED MUSICAL PIECE SIGNAL?
YES
NO
S124
RECEIVED MUSICAL PIECE SIGNALS OF PLURALITY OF TYPES ?
YES
NO
SELECT MUSICAL PIECE SIGNALS OF GROUP TO WHICH OWN UNIT BELONGS ACCORDING TO PREDETERMINED PRIORITY
S125
S126
RECEIVED NO MUSICAL PIECE SIGNALS?
NO
YES
S127
ACQUIRE MUSICAL PIECE SIGNALS TO BE REPRODUCED BY REQUESTING OTHER SPEAKER UNITS THAT BELONG TO SAME GROUP AS THAT OF OWN UNIT TO TRANSFER MUSICAL PIECE SIGNALS
S128
NEIGHBORING SEAT DETECTED AS CHILD SEAT OR SPECIFIED AS SILENCED, ETC.?
S129
YES
NO
S130
CREATE REPLAY SIGNAL SO THAT DESIRED AUDIO STATE IS SET ACCORDING TO STORED LAYOUT/REPLAY CHARACTERISTIC OR EACH SPEAKER, SET AUDIO REPLAY CHARACTERISTIC AND RECEIVED AUDIO CHARACTERISTIC
CREATE REPLAY SIGNAL ACCORDING TO STORED LAYOUT/REPLAY CHARACTERISTIC OF EACH SPEAKER, SET AUDIO REPLAY CHARACTERISTIC AND RECEIVED AUDIO CHARACTERISTIC
CONTROL AUDIO REPLAY OUTPUT TIMING ACCORDING TO MUSICAL PIECE SIGNALS RECEPTION TIME/COMMUNICATION OF SYNC SIGNAL WITH OTHER SPEAKERS
S131
REPLAY CREATED REPLAY SIGNAL BASED ON CONTROLLED OUTPUT TIMING
S132
RETURN

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FIG. 22A

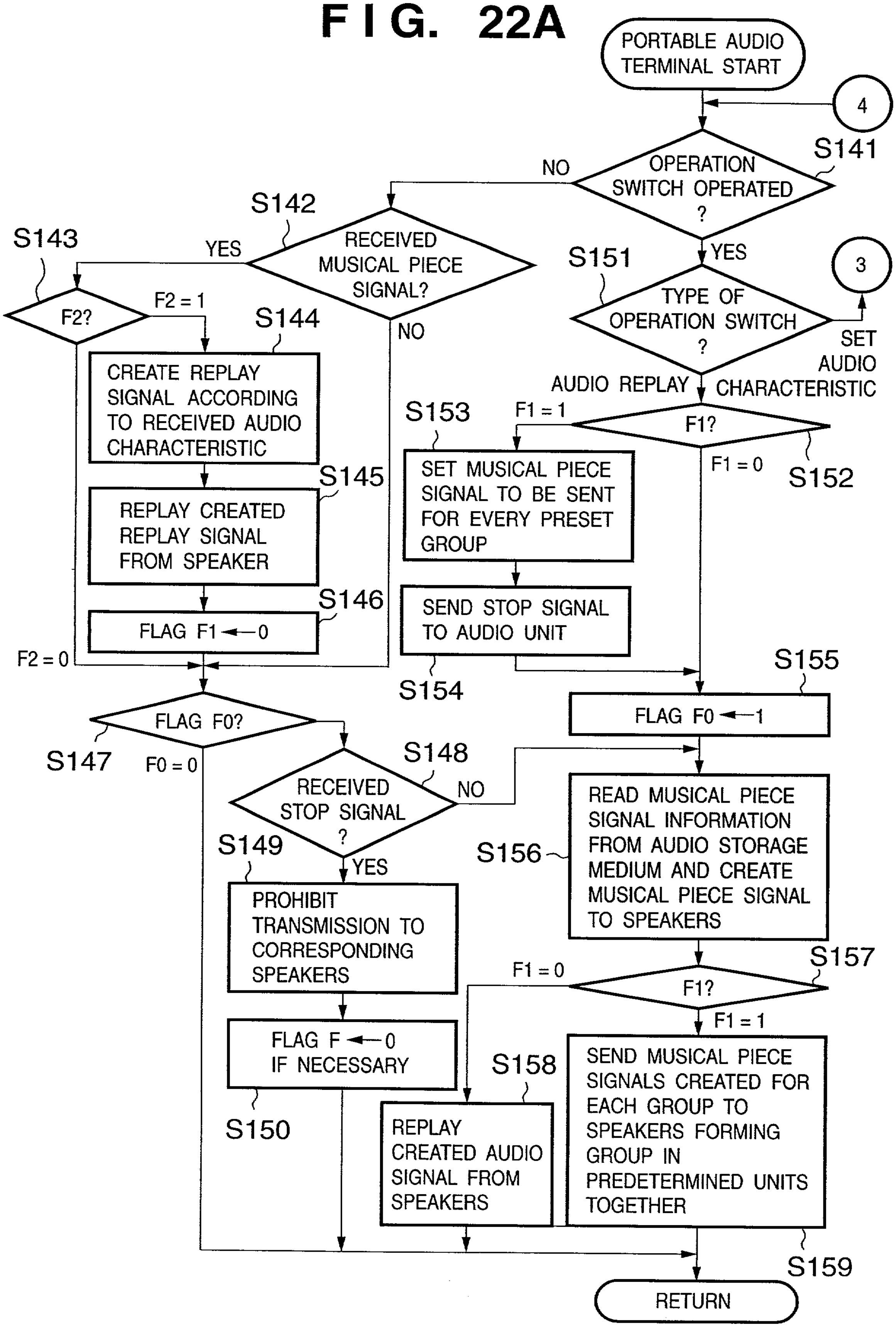
PORTABLE AUDIO TERMINAL START
4
S141
OPERATION SWITCH OPERATED ?
NO
YES
S142
RECEIVED MUSICAL PIECE SIGNAL?
YES
NO
S143
F2?
F2 = 1
F2 = 0
S144
CREATE REPLAY SIGNAL ACCORDING TO RECEIVED AUDIO CHARACTERISTIC
S145
REPLAY CREATED REPLAY SIGNAL FROM SPEAKER
S146
FLAG F1 ←0
S151
TYPE OF OPERATION SWITCH ?
3
SET AUDIO CHARACTERISTIC
AUDIO REPLAY
S152
F1?
F1 = 1
F1 = 0
S153
SET MUSICAL PIECE SIGNAL TO BE SENT FOR EVERY PRESET GROUP
SEND STOP SIGNAL TO AUDIO UNIT
S154
S155
FLAG F0 ←1
S147
FLAG F0?
F0 = 0
S148
RECEIVED STOP SIGNAL ?
NO
YES
S149
PROHIBIT TRANSMISSION TO CORRESPONDING SPEAKERS
FLAG F ←0 IF NECESSARY
S150
S156
READ MUSICAL PIECE SIGNAL INFORMATION FROM AUDIO STORAGE MEDIUM AND CREATE MUSICAL PIECE SIGNAL TO SPEAKERS
S157
F1?
F1 = 0
F1 = 1
S158
REPLAY CREATED AUDIO SIGNAL FROM SPEAKERS
SEND MUSICAL PIECE SIGNALS CREATED FOR EACH GROUP TO SPEAKERS FORMING GROUP IN PREDETERMINED UNITS TOGETHER
S159
RETURN

FIG. 22B

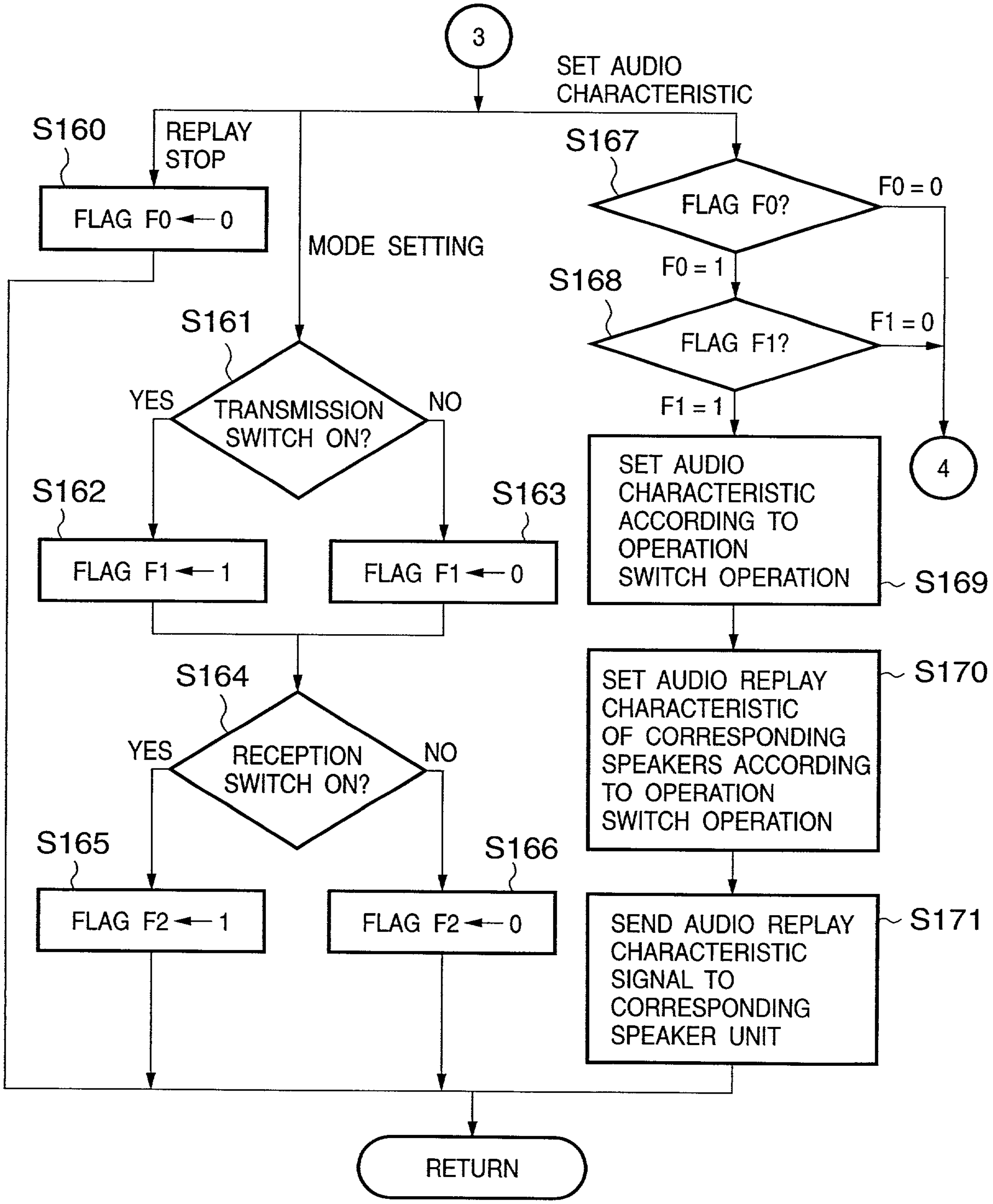
3
SET AUDIO CHARACTERISTIC
S160
REPLAY STOP
FLAG F0 ← 0
MODE SETTING
S161
TRANSMISSION SWITCH ON?
YES
NO
S162
FLAG F1 ← 1
S163
FLAG F1 ← 0
S164
RECEPTION SWITCH ON?
YES
NO
S165
FLAG F2 ← 1
S166
FLAG F2 ← 0
S167
FLAG F0?
F0 = 0
F0 = 1
S168
FLAG F1?
F1 = 0
F1 = 1
4
SET AUDIO CHARACTERISTIC ACCORDING TO OPERATION SWITCH OPERATION
S169
SET AUDIO REPLAY CHARACTERISTIC OF CORRESPONDING SPEAKERS ACCORDING TO OPERATION SWITCH OPERATION
S170
SEND AUDIO REPLAY CHARACTERISTIC SIGNAL TO CORRESPONDING SPEAKER UNIT
S171
RETURN

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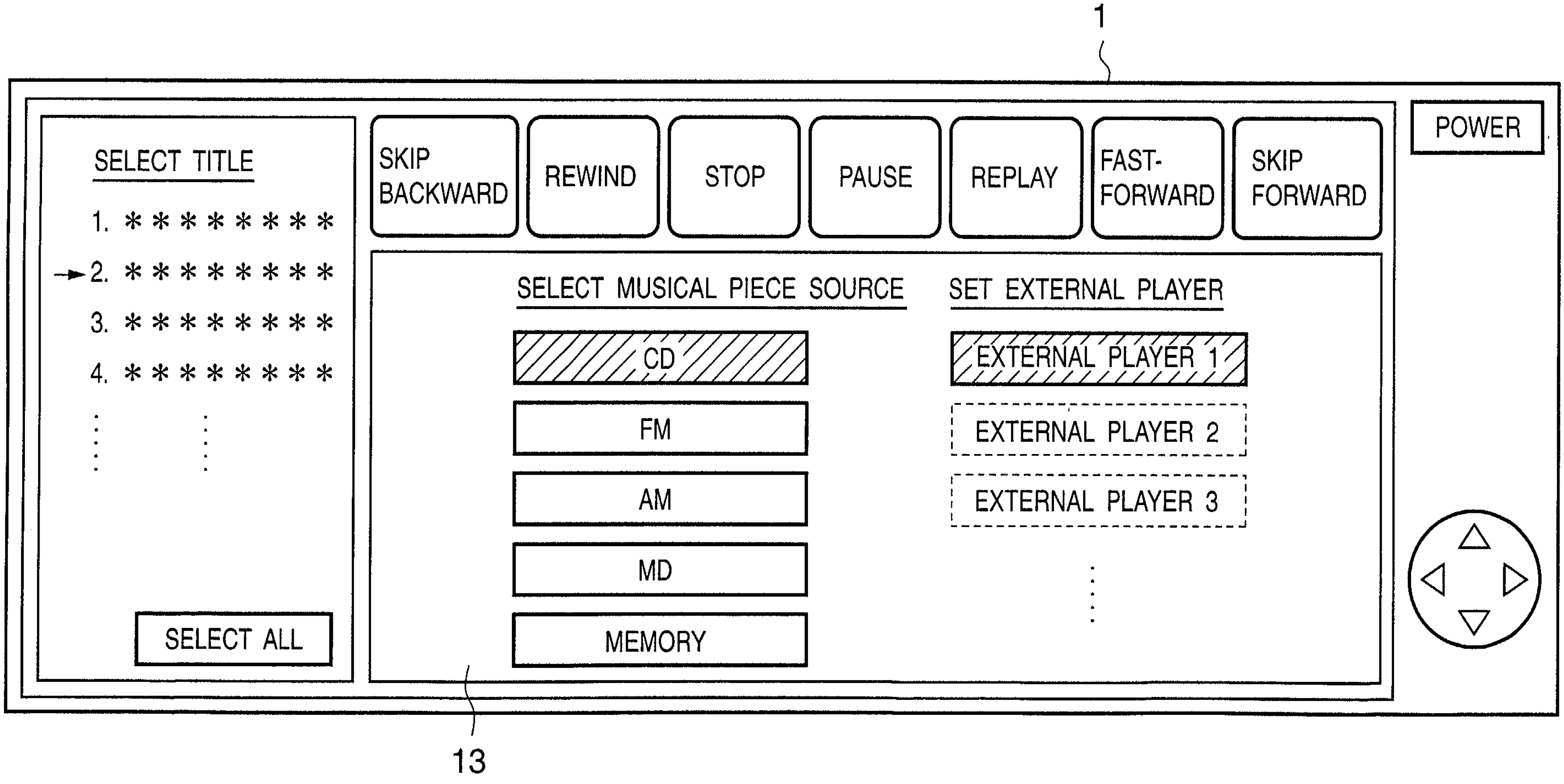
FIG. 23


1
POWER
SELECT TITLE
1. ********
→2. ********
3. ********
4. ********
SELECT ALL
SKIP BACKWARD
REWIND
STOP
PAUSE
REPLAY
FAST-FORWARD
SKIP FORWARD
SELECT MUSICAL PIECE SOURCE
CD
FM
AM
MD
MEMORY
SET EXTERNAL PLAYER
EXTERNAL PLAYER 1
EXTERNAL PLAYER 2
EXTERNAL PLAYER 3
13